SOUTHERN DIVISION AMERICAN FISHERIES SOCIETY

Spring 2013 Meeting

Nashville, Tennessee

February 7, 2013

2013 TROUT COMMITTEE MINUTES

Attendees: Matt Sell (Maryland DNR), Chairman; Matt Kulp (National Park Service), Vice Chairman; Patrick O'Rourke (Georgia DNR); Jim Burroughs (Oklahoma DW); Tom Whelan (Missouri DOC); Paul Port (Arkansas Game and Fish); Christy Graham (Arkansas Game and Fish); Chris Wood (North Carolina WRC); Andy Dolloff (USFS SRS and VA Tech); Brian R. Murphy, President SDAFS (VA Tech); Jeff Williams (Arkansas Game and Fish); David Dreves (Kentucky Fish and Wildlife Resources), Jim Habera (Tennessee Wildlife Resources Agency); Rob Lindbom (Tennessee Wildlife Resources Agency); Jeff Koppelman (Missouri DOC); Travis Scott (Tennessee Wildlife Resources Agency)

- Meeting called to order by chairman at 8:20am
- QUORUM: Sell checked on quorum – 8 voting members in attendance; bylaws require 10 members to be present
    - Therefore NO QUORUM; all business conducted will be "unofficial"
    - All voting and official business will be done via email in next couple weeks
- Brian Murphy (SD FAS President) introduced himself
    - Asked about results of using electronic media for members who could not attend
    - Sell indicate cost was too high given only one member requested the service
    - Murphy offered to address issue at upcoming EXCOM meeting
- TREASURERS REPORT: Jeff Williams (ARGF) reported a beginning balance of $1,088.54 (June 8, 2012) prior to the East Coast Trout Management Workshop
    - East Coast income was $16,103.71 and expenditures were $11,467.06
    - TC account balance AFTER workshop was $5,725.19 (February 4, 2013)
- Sell passed around updated membership list
- Murphy submitted that the EXCOM committee would like to appoint committee reps to two year terms to limit the confusion as to who is/is not still a member
- TREASURER ELECTION: Discussion about the treasurer position, Sell nominated Williams to sixth term as treasurer; Kulp seconds (no vote due to lack of quorum)
- VICE CHAIRMAN ELECTION: Discussion on vice chairman position; Kulp nominates Habera for vice chairman; Williams seconds (no vote due to lack of quorum)
- LOCATION OF 2014 TC MEETING: The 2014 SD AFS meeting will be in Charleston, SC
    - Whelan offered for Missouri to host as it has been a while since they did so

    - Discussion ensued regarding difficulty of travel budgets to ANY location in 2014
    - Discussed possibility of negotiating with host facility to provide opportunity to use electronic media to allow those who cannot attend meeting to participate
    - Murphy noted there is nothing in the bylaws stating you can NOT use multi-media for those who cannot attend
    - Sell offered to send Doodle poll to all members to determine location of 2014 meeting by popular vote
- MICROFISH UPDATE: Kulp reported that he spoke to Jack Van Deventer and that Jack had nothing new to report – still hopes for a new release in 2013
- Sell noted that he spoke with Steve Moore who related Habera, Moore and Tim King will be working on an update to the Southern Appalachian Brook Trout Position paper to update the section(s) related to genetics
- Considerable discussion related to need for long term water quality monitoring (i.e. chemistry and temperature) to provide inference to fish data
    - Kulp related information regarding the new Southeast Monitoring Network (SEMN) led by Debbie Arnwine (TN Dept. of Environment and Conservation)
    - SEMN made up of agency personnel from most southeastern states
    - Goal is to provide long term fish, benthos, water quality, hydrology and water temperature data at standardized sites in each state (sites already selected)
    - Sampling will take place annually with hope of partnering with other agencies
    - Debbie Arnwine contact info: ph 615-532-0703, email debbie.arnwine@tn.gov
- Sell requested discussion/ideas on possible uses for TC funds
    - Kulp suggested using some funds to pay Van Deventer for some of his time to develop the new Microfish in an effort to get it finished
    - Dolloff asked group if they have been using the program MARK
    - No further ideas; idea tabled
- Dolloff asked group about use of hand held computers in the field
    - Show of hands indicated most of group still using paper
    - Dollofff suggested using the new iPad mini as a good field tool
    - iPad mini's have a waterproof case, GIS and easily can output to common database software or Excel
- Habera updated committee proceedings document and will update again after minutes from this meeting are approved
- Round table discussion (see agency notes below)
- Henegar provided presentation with update to TWRA Tellico Hatchery system and brook trout production
- Kulp provided update on assortative mating and proposed brook trout speciation
- Meeting adjourned at 3:00pm

ADDENDUM

Because there was not a quorum present at the official meeting held at the SD AFS meeting in Nashville, Tennessee on February 7, 2013, the chairman decided to hold a special teleconference meeting to formally approve the minutes and any other pertinent business items. These are the minutes from that follow-up teleconference:

Teleconference for Trout Committee – February 20, 2013

Attendees: Matt Sell, Alan Heft, Jeff Williams, Tom Whelan, Jim Habera, Patrick O'Rourke, Larry Mohn, Jake Rash, Andy Doloff, Dave Dreves, Matt Kulp, and John Damer

- Matt Sell brought the meeting to order at approx. 11:00 EST. The first item discussed was the approval of the 2012 meeting minutes. Larry Mohn made a motion to accept the minutes 'as-is'. Jim Habera seconded the motion. All members present were in favor. The motion was passed and the 2012 meeting minutes are accepted. The second item discussed was the approval of the nomination of Jim Habera for chair-elect during 2014. Matt Kulp made a motion to accept the nomination. Dave Dreve seconded the motion. All members present were in favor. The motion was passed and Jim Habera was selected as chair elect for 2014. The final item discussed was the approval of Jeff Williams continuing as treasurer during 2014. John Damer made the motion to accept this nomination. Jake Rash seconded the motion. All members present were in favor. The motion was passed and Jeff Williams will remain as treasurer for 2014.

- At this time, a short discussion of meeting locations for the TC meeting in 2014 was held. A vote taken by the TC chose Missouri as the location during late spring. Tom Whelan agreed to host and suggested three locations to hold the meeting; Roaring River State Park, Bennett Springs State Park, or the city of Branson. Due to likely lower costs, one of the state parks will be chosen. Tom volunteered to send information on each park, as well as an estimate on costs to Matt Sell. Matt has agreed to poll the TC and decide on a location via popular vote. Mid May was chosen as the likely time frame. Also, a 3 day meeting is planned and will likely be a Tuesday through Thursday. Additionally, a small registration fee will be charged to offset costs of meals, snacks, and other accommodations.

- At this point, Matt Sell made a motion to adjourn the meeting. Jim Habera seconded the motion. Meeting was adjourned at approximately 11:20 EST.

2013 SDAFS Trout Committee Meeting, Nashville, TN
Roundtable Reports

Maryland – Matt Sell, Maryland Department of Natural Resources

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Brook Trout Life History Project

- PIT tagging continued in the Big/Monroe Run watersheds during 2012
- Preliminary growth and survivorship information is being calculated and will continue through 2015
- Over 1500 brook trout have been PIT tagged since 2010 and no new fish will be tagged during the 2013-14 recapture efforts

Savage River Brook Trout Movement Study

- Telemetry data was gathered from 16 radio tagged fish during 2012
- Tagged fish were tracked from March 1 until the end of 2012
- Found that there is a migratory fluvial population of brook trout in the Savage River
- Movements out of the mainstem river were correlated with rising spring water temperatures to thermal refugia in the tributaries or upper mainstem river
- Movements back into the lower mainstem river were correlated with the completion of spawning in the fall
- Migratory brook trout showed extremely high site fidelity, with most fish returning to the same pool where they were tagged
- The furthest moved fish was over 11 km and the average distance moved was around 6 km

Savage River Creel Survey

- A creel survey was conducted on the Put and Take portion of the upper Savage River during the spring fishing season, 2012
- Conducted to determine harvest and catch rates of both non-native stocked trout and wild brook trout
- Numerous angler reports suggested that the large migratory brook trout that are in that portion of the river seasonally were being harvested
- Creel data confirmed that brook trout harvest was indeed taking place
- Population estimates are going to be conducted during the early spring, 2013 to determine what impact this harvest

Savage River Genetics Analysis

- Genetics samples will be collected during the spring of 2013 before migratory upper Savage River brook trout move into the tributaries
- Samples from the fluvial brook trout as well as the two tributaries will be analyzed to determine if it is a metapopulation or multiple discrete populations

Big Run Large Woody Debris Project

- A large woody debris restoration project is planned for 2013 after a noticeable lack of woody debris habitat in the lower reaches of Big Run
- Plan designs are being approved and implementation is anticipated for 2014

Great Smoky Mountains National Park – Matt Kulp, GRSM

Vital Signs Monitoring

- Transitioning to new long term monitoring program in six watersheds (3 in TN, 3 in NC)
- Will include collocated water, inverts and fish along elevational gradient matched up with lysimeter, soil, forest ecology, air and other metrics
- Interested in long term changes associated with climate scale perturbations

Biotic Effects Study:

- Just completed final report on summarizing water, inverts and fish data from 1993-2010
- Report looked at acute/chronic toxicity of inverts and fish to pH, ANC, Al and other metals
    - Al toxicity for brook trout (0.09 mg/l) much lower than literature values (0.2 mg/l)
- Distinct differences in mean stream pH tolerances of brook trout (mean base flow 5.8) and rainbow trout (mean base flow 6.0) as seen in previous studies

Acid Deposition/TMDL Status:

- TDEC listed 12 GRSM stream as impaired due to low stream pH (mean<6.0) in 2006
- Prompted drafting of TMDL to address issue
- GRSM contracted with Charlie Driscoll at Syracuse University to apply PnET-BGC model to water data to produce series of target loads (TL's) and critical loads (CL's)
- EPA joined effort and is running their MAGIC model comparatively to PnET-BGC model
- GRSM hosted a TMDL workshop in December 2012 with state & federal air/water regulatory agencies, academia to discuss issue and develop mitigation strategies

Metapopulation Investigation:

- Will begin a study with King to determine if true metapopulations still exist in GRSM
- Collecting fin clips off two subwatersheds of East Prong Little River in summer 2013

Lynn Camp Prong:

- Restored 8.5 miles of Lynn Camp in 2008
- Put 2,000 SABT from 9 source streams in Lynn Camp in 2009

- Monitoring surveys in 2010 revealed small tributary section missed during treatment and illegal rainbow trout introductions in another section; both areas had reproduction
- Electrofished and retreated the lower 4 miles in 2011; added another 800 SABT in 2011
- Monitoring indicates recovery good and approaching pretreatment rainbow biomass

Major Slide/Debris Flow:

- A 200 foot section U.S. 441 in NC slid off the side of the mountain on January 16, 2013 creating a 3.2 acre slide scar down to Beech Flats Prong
- GRSM will be monitoring water quality above/below the scar to address sediment
    - Dolloff noted several recent papers in slides and their effects on fish and water

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Georgia – Patrick O'Rourke, Georgia DNR

Wild Trout Monitoring

Wild trout population monitoring in 2012 indicated that adult trout densities were similar to their historic means, with the exception of a 45% decline in adult brown trout. Monitoring results also documented strong representation of young-of-year rainbow trout in 2012; however, recruitment of age-0 brook trout and brown trout was well below average. Possible reasons for Georgia's low reproduction of brook and brown trout in 2012 include:

a) In Georgia, two very high flow events occurred in November 2011 that may have disturbed trout redds.

b) In addition, 2012 was the warmest winter on record.

c) The combination of high November stream flows coupled with record high winter temperatures may have worked in concert to negatively impact recruitment in 2012.

Although densities were lower than normal, sufficient numbers of adult trout were present going into the 2012 spawning season to allow the population to recover naturally.

Brook Trout Habitat Project

From 2007-2012, 343 log structures were installed in 32 brook trout streams. Post-construction monitoring indicated substantial increases in the amounts of large woody debris (285%), pool habitat (214%), and adult brook trout density (46%) in treated versus upstream reference areas. Brook trout were restored in three small streams by the removal of competing rainbow and brown trout with backpack electrofishers. Quarterly storm flow monitoring in 15 brook streams indicated that ANC values ranged from 20 to 60 meq/L and fluctuated seasonally.

Chattahoochee River Brown Trout Population Dynamics Study

Completed a 14-month study on population dynamics of brown trout in the Lanier Tailwater of the Chattahoochee River. Traditional aging via otoliths was highly inaccurate and over 2,000 fish were tagged (1/4 were recaptured) for increment analysis of individual fish. Average fish showed very slow growth beyond 250 mm, though fish up to nearly 700 mm were collected. Diet analysis indicated that approximately 2/3 of all brown trout sampled were consuming small midges, by far the most abundant diet item found. It appeared that (intermediate-sized) food availability may be a limiting factor for

larger fish, causing growth to slow considerably beyond age 2-3. A few fish probably transition to piscivory and exhibit much faster growth, making up the "trophy" component of this fishery. No movement of tagged fish within or between tagging sites was ever recorded, suggesting that these fish exhibit very strong site fidelity despite almost daily hydropeaking activity.

Toccoa River Trout Fishery Recovering from Dam Impacts

In 2010, the trout fishery in the Toccoa tailwater was impacted by warm water as a result of TVA's Blue Ridge Dam Rehabilitation Project. Despite minor ongoing temperature issues, the trout population has rebounded strongly over the last two years. WRD worked closely with TVA during 2012 to mitigate for high temperatures on the lower tailwater by modifying daily release schedules. Targeted stocking efforts by WRD and USFWS in late 2010, 2011, and 2012, have increased overall trout abundance by over 400% from 2010 to 2012 (Fall EF catch, all species). Overall abundance is now 92% of 2009 (pre-dam-repair) levels. The trout population is now dominated by brown trout, perhaps because they are more tolerant of high temperatures. Rainbows (formerly 75% of population) have been slower to recover, especially those over 14". Angler reports and media attention have been very positive recently. Future impacts of ongoing dam repairs remain unknown, but we are hopeful that the recovery will continue.

North Carolina – Jake Rash, North Carolina Wildlife Resources Commission

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Trout Distribution

The NCWRC continues its efforts to document the distribution of North Carolina's wild Brook, Brown, and Rainbow Trout populations. To date, over 600 Brook Trout populations have been identified. In 2013, NCWRC will seek to finish initial sampling efforts to identify populations; plus, populations identified within legacy data will be revisited to maintain current records.

Brook Trout Genetics

NCWRC has been collecting genetic information for the State's Brook Trout in conjunction with trout distribution efforts. Results from allozyme testing indicate 38% of populations are of Southern Appalachian origin, 10% are of northern origin, and 52% are of mixed genetic origin. In 2011, the NCWRC began obtaining genetic information via the use of microsatellite DNA analysis, and currently, tissue samples from approximately 400 populations (> 6,000 individuals) are being analyzed. This approach will help to provide further insight regarding the State's Brook Trout and develop a genetically-based restoration framework.

Trout Management Plan

NCWRC is completing revisions to its trout management plan. Revisions were obtained via collaborative process involving staff, management partners, and a diverse group of stakeholders. NCWRC will seek to implement its new plan in 2013.

Eastern Brook Trout Joint Venture

NCWRC has continued to be actively involved with the Eastern Brook Trout Joint Venture (EBTJV). Currently, Doug acts as Chair of the EBTJV Steering Committee and Jake serves as the Chair of the Conservation Strategy / Habitat Subcommittee.

Long-term Trout Monitoring

In 2013, the NCWRC initiated efforts to obtain routine data on wild trout populations. Initial long-term monitoring efforts were completed in 1996; however, recent data are desired to gain a greater understanding of wild trout population dynamics in waters managed by the NCWRC. As appropriate, the NCWRC will continue to seek to partner with fellow resource agencies to develop more robust data sets.

Persistence and Movement of Stocked Trout

NCWRC is working with North Carolina State University to investigate the persistence and movement of stocked trout. NCWRC manages approximately 1,000 miles of lentic resources via intensive, seasonal stockings of catchable-size trout. Anglers and managers perceive that catch rates significantly decline through time following a stocking event. This trend is expected in Hatchery Supported Trout Waters, where harvest is encouraged; however, declining catch rates are also observed in Delayed Harvest Waters during the period when harvest is not permitted. Increased understanding of stocked trout movement and survival after stocking events will allow mangers to improve their management of stocked-trout resources.

Contribution of Stocked Brown and Rainbow Trout in Apalachia Reservoir

Currently, Apalachia Reservoir supports cool- and warm-water species but does not provide any significant recreational fisheries. Apalachia Reservoir has suitable trout habitat year-round and a clupeid forage base. Thus, the impoundment is a candidate for put-grow-and-take trout stockings and has the potential to produce large fish. NCWRC will evaluate the best size and species of trout for put-grow-and-take stockings in the impoundment. Initial trout stockings for this evaluation occurred in 2012.

Evaluation of Advanced Fingerling Brown Trout Stockings in Bridgewater Tailrace

NCWRC has worked to establish a put-grow-and-take Brown Trout fishery in Bridgewater Tailrace since 1995. These efforts have been successful in establishing a fishery; however, recent NCWRC surveys and angler reports indicate that success has been intermittent. Long-term water quality data suggests that thermal bottlenecks in the system may limit trout survival. Alterations to the hydropower facility regulating this reach will allow the NCWRC to explore an alternate management regime for Bridgewater Tailrace: stocking approximately 10,000 advanced Brown Trout fingerlings (180 –205 mm total length) following the period of a potential thermal bottleneck.

Kentucky – Dave Dreves, Kentucky Department of Fish and Wildlife Resources

Cumberland Tailwater Update

Wolf Creek Dam repairs are nearing completion. Current projections from the Corps are that the project will be completed this spring, which is much earlier than the previous planned completion in December 2013. The Corps is proposing to raise Lake Cumberland in increments. The initial increment will target an operating zone between elevations 700 and 705 feet or about 20 feet higher than the current range of elevation 680 and 685. They will monitor instrumentation to see how the dam responds to the higher lake level through the summer and then have the normal fall drawdown back to around 685 ft. If everything looks good then we can expect the Corps to let the lake come up to full pool of 723 ft in spring 2014.

The impacts of the dam remediation on the trout fishery over the last 5 years have been dramatic. We have documented decreased growth rates and the catch rate of both rainbows and browns greater than 15 in has severely declined. Brown trout CPUE ≥15 in has decreased 73% from fall 2007 to fall 2012 and rainbow trout CPUE ≥15 in has decreased 98% over the same period. We continue to stock brook trout and triploid rainbow trout but all trout research on the Cumberland tailwater has been suspended until things return to normal.

A manuscript was prepared on the effects of the 20 in minimum size limit/1fish creel limit regulation on brown trout in the Cumberland tailwater and submitted to North American Journal of Fisheries Management. We recently got word that it has been rejected but we believe there is good information there so we plan to submit it to a regional journal.

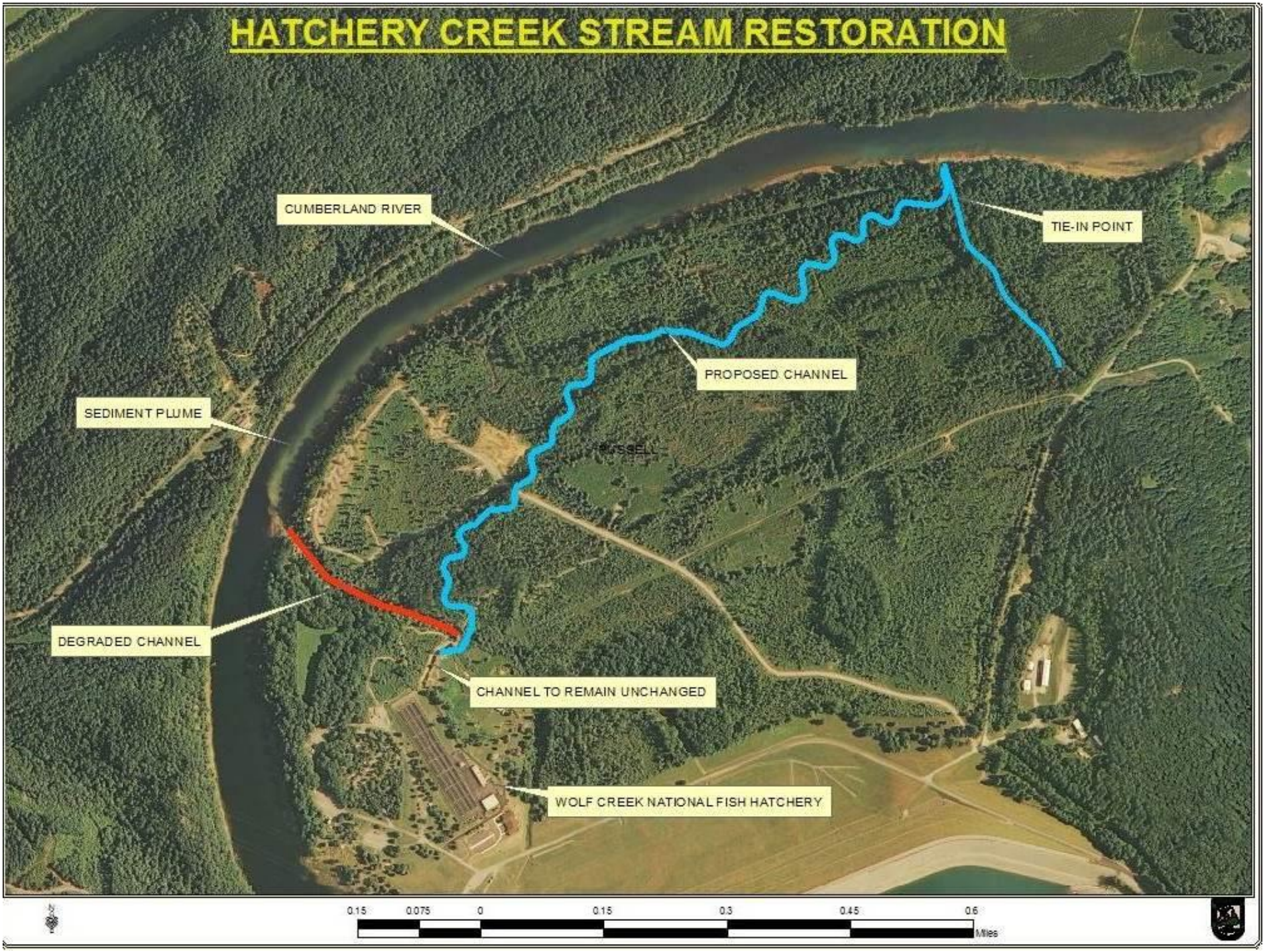
2013 Trout Angler Survey

A Trout Angler Survey will be conducted in spring 2013. This will be a repeat of a similar survey last conducted in 2003. We are currently finalizing the questions and plan to begin mailing surveys out by April. Survey results should be available by late summer.

Hatchery Creek Update

- Project funded through KDFWR Wetland and Stream Mitigation Program
- Partnering with Wolf Creek National Fish Hatchery
- Located on U.S. Army Corps of Engineers property
- $1.95 million project cost
- ~6,000 linear feet of natural channel design
- Focus on trout spawning habitat
- Expect to break ground in late spring/early summer 2013

- Fishable in fall 2013
- Expect regulations to be artificial baits and catch and release only


HATCHERY CREEK STREAM RESTORATION
CUMBERLAND RIVER
TIE-IN POINT
PROPOSED CHANNEL
SEDIMENT PLUME
DEGRADED CHANNEL
CHANNEL TO REMAIN UNCHANGED
WOLF CREEK NATIONAL FISH HATCHERY
0.15
0.075
0
0.15
0.3
0.45
0.6
Miles

FINS Program Update

The KDFWR created the Fishing in Neighborhoods (FINs) program in 2006 to provide anglers with quality fishing opportunities close to home. In 2013 the program includes 39 lakes in 25 counties across the state. Lakes are regularly stocked with catfish and rainbow trout throughout the year. In addition to these lakes being stocked with catfish and trout, the sunfish and bass populations are regularly sampled to ensure natural reproduction is meeting the needs of anglers. Stocking of hybrid sunfish and/or largemouth bass occur if needed. The FINs program is a cooperative agreement between KDFWR and city/county municipalities. Lake owners have committed to cover 25% of the stocking costs. All 39 lakes in the FINs program have a standard set of regulations that are posted around the lakes. These regulations are a little more restrictive than the statewide regulations but help spread the fish harvest out over a longer period of time. The size and creel limits are: 5 rainbow trout, 4 channel/blue catfish, 1 largemouth bass with a minimum size limit of 15", and 15 bluegill/other sunfish.

A total of 137,000 rainbow trout (9-11") were stocked in 2012. Lakes/ponds ranged in size from 1-46 acres (245 total acres in program, most lakes < 10 acres). Trout were stocked in all ponds/lakes 3 times annually in Oct/Nov, Feb, and Mar. Stocking rates in urban lakes were as follows; 1-2 acres 500 trout, 3-4 acres 1,500 trout, 5 acres+ 2,500 per stocking. The Feb trout stocking rate was ½ the normal rate for lakes > 3 acres.

There is a tagging exploitation study ongoing at one FINs lake in 2013. We just concluded an exploitation study at two small impoundments in 2012; however we haven't had a chance to fully analyze those numbers. We did observe that tag return rates were extremely high. We conducted a tagging study in 2011 at a 7 acre impoundment that had a corrected return rate of 88% for trout (9-11" fish) and a harvest rate of 32%. We also conduct a creel survey in conjunction with the exploitation studies. We are finding the number of trout caught exceeds the number of stocked fish indicating that many fish appear to be caught multiple times before being harvested. Harvest rates from the creel survey are near the number of stocked trout. At several of the small impoundments where we have conducted creel surveys we are seeing fishing pressure exceeding 5,000 man-hr/acre.

Floyd's Fork

Floyd's Fork is a wadeable stream on the outskirts of Louisville. A nearly 20 mile stretch of river will soon be open to public access, thanks to acquisition of private property along the stream for a unique park system. Alongside most of the stream will be the "Louisville Loop" a 100 mile walking/biking trail. Canoe/kayak access sites will be located every 2-3 miles along the stretch of river as well as parking areas along the stretch. In addition to warm water fishing opportunities, KDFWR proposed a seasonal rainbow trout fishery with stocking beginning in spring 2012. There are currently two stocking sites within the park. A total of 1,200 trout are being stocked each month in Oct, Mar, and Apr for a total of 3,600 fish. The park is opening in stages, and as the park fully opens to the public over the next 2-3 years additional stocking sites are planned with more trout being stocked. This is a seasonal trout fishery near a large urban center. A research project surveying angling pressure, catch, harvest, fish movement, is planned in the near future.

Trout Management Plan

A statewide Trout Management Strategies and Phase I Action Plan were completed in late 2011. Phase I actions specified in the plan include a standardized re-allocation of trout stockings in all waters based on the parameters Use, Access, and Size. Use and Access were broken down into 3 subjective categories and Size was broken down into 2 or 3 subjective categories depending on water type (streams, tailwaters, lakes etc.). Another action specified was to gather new temperature data in all trout waters to better determine months which are suitable for stocking. Temperature loggers were purchased and distributed to District personnel for deployment in streams. Most streams and tailwaters receiving trout now have at least one season of recent temperature data and loggers will continued to be deployed to gain multiple years of temperature data for each. Temperature data are also being gathered on impoundments stocked with trout. A re-classification of all trout streams will be developed that will rank streams into four classes base on three parameters: temperature, habitat quality and native fish community structure. The allocation of trout will continually be refined in all trout waters as new data is gathered.

Questions

Any committee members have experience with trout sampling in year round reservoir trout fisheries. Specifically what gear, timing, etc.?

Anyone conduct small stream use assessment or formal creel surveys. What has worked and what hasn't? Anyone try game camera type surveys?

Anyone conduct tailwater trout fishery use assessment or formal creel survey at night?

Arkansas - Jeff Williams, Arkansas Game and Fish Commission

Implementation of minimum flow on Bull Shoals and Norfork Tailwaters is getting closer to coming to fruition. A target minimum flow of 300 cfs was authorized at Norfork and will involve an increased release of 185 cfs on top of the current minimum flow of 115 cfs resulting from the house unit, dam leakage, and outflow form the Norfork National Fish Hatchery. The target minimum flow at Bull Shoals is 800 cfs and will require an additional release of 590 cfs on top of the existing 210 cfs from the house unit and dam leakage. The reallocation of storage for minimum flow will result in an increase in conservation pool elevation of 1.75 feet on Norfork Lake and 5 feet on Bull Shoals Lake. As part of the minimum flow agreement the Arkansas Game and Fish Commission (AGFC) is responsible for the modification or relocation of public and private facilities (roads, docks, etc.) that might be negatively impacted by the increase in pool elevation. These modifications must be completed before minimum flow storage can be captured. All of the work on Norfork Lake has been completed and the construction of the siphon tube that will provide the 185 cfs flow is finished. The Corps of Engineers (COE) is currently trying to resolve an issue with the tube being able to hold the siphon once it is primed. At Bull Shoals the lake-side modifications are about 75% complete and should be completed by Memorial Day.

Minimum flow at Bull Shoals will be run through an existing turbine and releases should begin shortly after the lake-side modifications are complete.

In most years hydropower releases are sufficient to keep water temperatures in the optimal range for trout in the lower reaches of the Bull Shoals and Greers Ferry Tail waters. However, in late July 2012 low lake levels and a concern over an extended drought prompted the Southwestern Power Administration (SWPA) to purchase power rather than generate using the dams of the White River System. Minimal releases coupled with a prolonged period of air temperatures in excess of 100° F resulted in water temperatures in these areas approaching 80° F. We began receiving and investigating reports from anglers of fish kills. Although we did not observe a large-scale trout kill, we did see small pockets of dead trout as well as extremely stressed fish. AGFC implemented stocking restrictions on the lower 8 miles of the Greers Ferry Tail water and the lower 30 miles of the Bull Shoals Tail water. The minimum daily release agreements in place at these projects were in fact being met, but were not sufficient to maintain water temperatures. Shortly after a U.S. Senator became involved in the issue SWPA began releasing 40% above the minimum release amount, which alleviated the high water temperatures. Annual population samples conducted approximately three months later revealed that the high water temperatures had impacted the relative abundance of rainbow trout and brown trout in the lower reaches of these systems.

AGFC will soon be initiating a growth and survival study on the Greers Ferry Tail water to aid in evaluating the success of management strategies implemented in 2006 as a management plan for this fishery was drafted. The study will involve the marking of seasonal cohorts of catchable rainbow trout and catch-curve analysis to estimate survival and growth parameters. Unlike most of our other brown trout fisheries in Arkansas, however, the brown trout fishery in Greers Ferry Tail water is a totally self-sustaining. Therefore, brown trout will be collected and implanted with PIT tags in the field seasonally. The robust design in Program MARK will be used to analyze subsequent recapture data.

Tennessee – Jim Habera, TWRA

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1. Tennessee's brook trout distribution surveys continued during 2012, with 70 of 112 streams (63%) now completed. Overall, there has been a loss of 22 km in 25 streams, a gain of 22.5 km in 24 streams, and no change in 21 streams for a net gain of 0.5 km relative to the previous survey from the 1990s. Distribution gains resulted in the reconnecting of three meta-populations. Although brook trout have been lost in five streams, there are also six 'new' populations, including two restored populations, two re-colonizations, one previously undocumented population, and one that could represent either a re-colonization or a previously unknown population. Additionally, of the 70 streams for which new distribution data have been obtained, 43 are common to the survey from the late 1970s/early 1980s. Somewhat surprisingly, there was a net loss of only 1.7 km for these 43 streams over the past three decades. Surveys of the remaining 42 streams should be completed during 2013.

2. Tennessee's brook trout genetics inventory is also nearing completion. Tissue samples from four populations were collected during 2012 and provided to Tim King (USGS) for microsatellite DNA analysis. Samples from two populations remain to be collected in 2013 (plus any new populations that may be identified).

3. The Sycamore Creek brook trout restoration project continued in 2012 with a third electrofishing effort that removed over 800 rainbow trout (30-40% YOY) in the lower 3 km of this stream. The goal of this cooperative effort (TWRA, USFS, NPS) is to re-establish southern Appalachian brook trout in a relatively large stream (3rd order, ~5 km long). One hundred brook trout (102 mm) produced at the Tellico facility during fall 2011 were stocked in the lower-most reach of Sycamore Creek in August 2012, and more adults were collected and spawned during the fall of 2012 (~700 fry onsite Feb. 1). Fingerlings produced from this effort will be stocked during spring 2013.

4. A cooperative project with TU was begun in 2012 to re-establish native southern Appalachian brook trout in the Nolichucky River watershed (they do exist in the NC portion of this watershed). The initial phase involved determining if there are any water quality issues (e.g., low pH) that might preclude transplanting brook trout into a stream has been devoid of fish for several decades. Preliminary results indicate low pH (<5) and a poor benthic community, thus other streams (requiring rainbow trout removal) are being considered.

5. Proposed creel and size limit changes for a set of 18 wild trout streams that had been under special regulations will become effective on 1 March 2013. These new regulations are more consistent with the biological characteristics of TN's wild trout populations. Ten streams returned to the statewide daily creel of 7 fish (no size limit or gear restrictions), while 8 streams (which include some of TN's best wild trout waters) retained their single-hook artificial only gear restriction and will have a 5 fish daily creel limit and no size limit. The statewide 6 inch minimum size limit for brook trout was also eliminated.

Missouri – Tom Whelan, Missouri Dept. of Conservation

Eleven Point River (Blue Ribbon Trout Management Area) Strain Study

The following information explains the objectives of the study and project plan. We are currently working through step 3 (of phase 1) of the project plan.

1. *Maintain a fishery of catchable-sized RBT within the Eleven Point River Blue Ribbon Trout Area (BRTA). This will be accomplished by increasing the current estimated first-year survival of 5% to at least 10% first-year survival of stocked fish within the BRTA.*

2. *Provide a "wild-type" fishing experience in the BRTA of the Eleven Point River through catch of fish with a long residence time. By stocking different strains of trout or smaller trout in higher numbers, fish surviving to a catchable size will more closely mimic wild fish in appearance and behavior. This will provide anglers with a better experience while saving MDC rearing costs.*

PROJECT PLAN

Phase 1: Experimental strain evaluation using catchable-sized fish.

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Maramec Spring Hatchery Parasitic Copepod Study

Maramec Spring Hatchery has been plagued with an infestation of the parasitic copepod, *Salmincola californiensis* for many years. This parasite attaches to the mouth and gills of Rainbow trout. Although usually not fatal in the wild this parasite is very prolific and detrimental in hatchery situations. The high density culture techniques in our cold-water hatcheries lead to severe outbreaks. The serial use raceways at Maramec are the perfect situation for the copepod to proliferate causing chronic mortalities. Highly infected fish, 50 copepods per fish and greater, are weak and aesthetically unpleasing to anglers.

The Missouri Trout Plan's number one goal is to provide anglers with quality trout fishing. A new regulation implemented by the Commission has also made transferring fish infected by this parasite to uninfected waters illegal. This regulation is threatening the survival of several commercial hatcheries in Missouri.

Attempts made in the past to remove the parasite from the hatchery were unsuccessful. Electroshocking of the water supply to the hatchery (spring pool) to remove all host species done approx ten years ago was short lived. The spring pool that feeds the hatchery at Maramec can be accessed by the infected fish in the Maramec watershed which perpetuates the life cycle of this parasite. The infected fish stocked can swim back up stream and into the hatchery water supply. Mechanical and chemical efforts to eliminate the copepods are not possible. The life cycle of copepods includes free swimming copepodid larvae, which infect the fish downstream of the adult host. Laboratory and commercial hatchery trials done by John C. Modin and Tresa M. Veek on the Lower

Merced River demonstrated that Brook trout *Salvelinus fontinalis* effectively removed the copepodid larvae from the water and reduced the infestation by more than 89%(Modin 2002).

Maramec Hatchery staff is modeling their study after the one done by Modin and Veek at the Calaveras fish farm in California, to study the effectiveness of using a population of Brook trout as a biological filter to remove the copepodid larvae from the Maramec hatchery water supply. Maramec Hatchery has hatch and raise 25,000 brook trout for the study. Brook trout three inches in size were moved to pool 1 of the raceway serving as a biological filter for the rainbow trout. The spring pool serves as the source for the copepodid larvae. Pool 2 was stocked with clean fingerling rainbows from Montauk Hatchery. Throughout the study copepods counts on the Rainbow Trout in pool 2 and the Brook Trout in Pool 1 were conducted to determine if adult copepods are present.

To date the use of brook Trout as a filter has shown to be effective in keeping Rainbow Trout in pool 2 relatively copepod free. Maramec Hatchery staff intends to repeat the study using Brown Trout as the filter. The Mo. Dept. of Conservation does not intend to culture Brook Trout for stocking proposes. Brown Trout are stocked in the management area below Maramec Park.

Didymo

The Missouri Department of Conservation (MDC) has been encouraging trout anglers and others to help prevent the spread of didymo" (*Didymosphenia geminata*) or "rock snot," to Missouri's cold-water streams and rivers.

The Missouri Conservation Commission approved a regulation change banning the use of porous-soled waders or footwear incorporating or having attached a porous sole of felted, matted, or woven fibrous material when fishing in trout parks and other specific trout waters. The new regulation went into effect March 1, 2012, the opening day of catch-and-keep fishing at Missouri's four trout parks.

Porous-soled waders and wading boots, worn by many trout anglers, appear to be the most likely pathway for the spread of didymo. The soles hold moisture for days and can harbor cells of this alga. Anglers who visit waters with didymo can, unknowingly, transfer these cells to the next stream they visit.

To help reduce the spread of didymo, MDC has been reminding anglers to: **Check**, then **Clean** or **Dry** their waders and fishing gear**.**

- **Check** all gear and equipment and remove any visible algae. Dispose of algae by placing it in the trash, not by putting it down a drain or into bodies of water.
- Then **Clean** all gear and equipment with a solution of 2-percent bleach, 5-percent saltwater, or dishwashing detergent. Allow all equipment to stay in contact with the solution for at least three minutes. Soak all soft items, such as felt-soled waders and wader boot cuffs, neoprene waders and life jackets, in the solution for at least 20 minutes.
- Or then **Dry** all gear and equipment for at least 48 hours by exposing it to sunlight.

To help anglers clean their waders before entering Missouri trout streams, MDC has installed wader wash stations at Missouri's five cold-water trout hatcheries: Bennett Spring State Park near Lebanon,

Montauk State Park near Salem, Roaring River State Park near Cassville, Maramec Spring Park near St. James and Shepherd of the Hills Hatchery by the upper portion of Lake Taneycomo near Branson.

All anglers are being encouraged to replace their porous-soled waders with ones that have non-porous rubber or synthetic soles.

Zebra Mussels

Zebra Mussels are present in Missouri waters. MDC continues to use the following protocols to reduce the chance of contamination to our hatchery facilities or spreading to uninfested waters.

- **EQUIPMENT DECONTAMINATION PROCEDURES**

Appropriate safeguards to prevent the transfer of zebra mussels from one water body to another are mandatory and include inspection, treatment, and, if possible, avoidance. The following steps detail equipment decontamination procedures:

1. Thoroughly inspect boats (hulls, drive units, trim plates, transducers), trailers and components (rollers, bunk boards, axles, etc.), equipment (i.e., water pumps, hatchery equipment, siphons, nets, ropes, traps, etc.), and machinery (tractors, bulldozers, etc.) for adult zebra mussels. Pay close attention to nooks, crannies and other inconspicuous places (i.e., around the motor housing, trim tabs, and water intake screens, or pump fittings). All trash, mud, vegetation, and suspected zebra mussels should be removed and properly disposed of in the trash. Immediately report suspected occurrences of zebra mussels to the Invasive Species Coordinator.

Carpeted bunks and runners on existing boat trailers should be replaced with poly, plastic or wooden bunks as soon as practical; boat trailers regularly moved between known zebra mussel infested waters and other waters should have carpeted bunks and runners replaced immediately. As available, future boat trailers should be purchased with poly/plastic/wooden bunks.

2. All water should be drained from boats, trailers, motors, live wells, bilges, transom wells, holding tanks and live wells, water pumps, pipes, and other equipment prior to leaving a waterway. Pay particular attention to boat hulls under installed decking. Drain as much water as possible from equipment such as lower motor units and portable pumps.

3. Any boat, trailer, tank, equipment, machinery, gear, or net transferred from one body of water into a different body of water or from known infested waters to potentially infested waters must be decontaminated using one of the treatments in Table 1 prior to being used in a new body of water. Equipment decontamination procedures should be completed when moving equipment from infested areas of a water body to uninfested areas of the same water body.

If boats, nets, and other equipment are only used in one body of water, cleaning between uses is not necessary, but these boats, nets, and other equipment MUST be clearly labeled for use in that body of water ONLY. Periodic cleaning and decontamination (i.e., during winterization or other maintenance)

should be conducted to prevent costly repairs. If management or research activities require this equipment to be moved in the future, decontamination procedures will be implemented.

1. Air drying and hot water are most effective when used in conjunction with each other because their effectiveness is highly dependent upon ambient temperatures and contact times. As needed, hot water wash units should be made available at selected Department facilities.

2. Household bleach (5.25% chlorine) and vinegar can be purchased from grocery or convenience stores. HTH granular chlorine (70% calcium hypochlorite) and Sodium Thiosulfate can be purchased at pool supply stores or chemical companies.

3. All bilges and hidden areas under boat decks must be thoroughly treated as described above.

4. Source: WI DNR (2007) *Equipment Disinfection Protocol for Invasive Species and Viruses*.

Table 2. Disinfectant Amounts to Make Needed Concentrations

Disinfectant	1 gallon	2 gallons	5 gallons	20 gallons	100 gallons
100% Vinegar	1 gal	2 gal	5 gal	20 gal	100 gal
200 ppm Chlorine (household bleach, 5.25% Chlorine)	0.5 ounce (15 ml)	1.0 ounce (30 ml)	2.5 ounces (75 ml)	11.0 ounces (300 ml)	6 1/3 cups (1.5 L)
200 ppm Chlorine (HTH granular)	0.04 ounce (1.2 g)	0.08 ounce (2.4 g)	0.2 ounce (6 g)	0.8 ounce (24 g)	4.2 ounces (120 g)
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1% Salt Bath (as NaCl)	1/8 cup	1/4 cup	2/3 cup	2 2/3 cups	13 1/3 cups

● HATCHERY PRECAUTIONS

Best management practices are being used to protect equipment and facilities and to reduce the opportunity for the spread of zebra mussels to uninfested areas. Introductions of zebra mussels into MDC fish hatcheries or water supply sources would have devastating impacts upon hatchery infrastructure. If infested, hatcheries would then be a possible mechanism for transporting the organisms to uninfested waters.

The following precautionary measures have been enacted by MDC fish hatcheries:

1. All attempts will be made to secure fish from sources known to be free of zebra mussels.

2. All fish and eggs exposed to surface water coming into or leaving any of MDC's hatcheries or other facilities and any fish procured through contract or other means from outside sources must be treated during transportation using one of the treatments in Table 3. The only exception will be for fish that are stocked into the same water supply that is used by the hatchery (e.g., trout stocked in Bennett Spring branch by Bennett Spring Hatchery staff) and for selected species of conservation concern.

Table 3. Hatchery/Fish/Aquatic Organism Zebra Mussel Treatments and Usage Guidelines

Treatment	Concentration	Contact Time	Usage Guidelines/Comments
NaCl	20,000 ppm	2 hrs	Used for striped bass only. Treatment conducted during transport.
KCl/formalin	750 ppm KCl 25 ppm formalin	1 hr 2 hrs	Used for all other fish species and eggs. Fish and hauling water are pretreated for 1 hour with 750 ppm KCl, followed by a 2 hour treatment with 25 ppm formalin during transport. *DO NOT* treat fish with NaCl to counteract shock, as this decreases the effectiveness of the treatment.

Missouri – Tom Whelan, Missouri Department of Fish and Wildlife Resources

Eleven Point River (Blue Ribbon Trout Management Area) Strain Study

The following information explains the objectives of the study and project plan. We are currently working through step 3 (of phase 1) of the project plan.

1. *Maintain a fishery of catchable-sized RBT within the Eleven Point River Blue Ribbon Trout Area (BRTA). This will be accomplished by increasing the current estimated first-year survival of 5% to at least 10% first-year survival of stocked fish within the BRTA.*

2. *Provide a "wild-type" fishing experience in the BRTA of the Eleven Point River through catch of fish with a long residence time. By stocking different strains of trout or smaller trout in higher numbers, fish surviving to a catchable size will more closely mimic wild fish in appearance and behavior. This will provide anglers with a better experience while saving MDC rearing costs.*

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Phase 1: Experimental strain evaluation using catchable-sized fish.

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